AMENDMENTS TO THE CLAIMS

Claim 1 (Currently Amended): An image configuring apparatus comprising:

an object image configuring means, which reads image data of a plurality of reduced object images from a reduced image recording means for recording image data of a plurality of reduced object images obtained by photographing an object as using a compound-eye camera that focuses a plurality of reduced object images on a photo detector through micro lens array having a plurality of micro lenses arrayed therein, and configures a single object image based on said image data and then outputs its image data,

wherein said object image configuring apparatus is also configured such that said micro lens and said light receiving elements are set without alignment error, and are preset in [[the]] conditions including the distance between the object and the micro lens array, using [[the]] an aligning distance of each micro lens of the micro lens array and [[the]] a focal length of the micro lens array, and based on such presetting conditions ~~condition~~, [[the]] a magnification ratio of a reducing optical system is calculated with the known distance between [[to]] the object and the micro lens array, and by obtaining [[the]] a relation among one pixel of the reduced image element and its corresponding area of the object, and previously obtaining [[obtain]] the geometric transfer function T_k describing optical projection from [[the]] said [[real]] object to create said reduced image element and inverse transfer function T_k^{-1};

wherein said object image configuring means comprises:

a generating means of initial object image for generating [[an]] initial image data of a single object image based on [[an]] image data of a plurality of said reduced object images captured by said micro lens array under said known condition using said inverse transfer function T_k^{-1};

a reduced image estimating means for estimating an estimated image of each of said reduced object images from [[an]] image data of a provided single object image which comes from said generating means of initial object image, based on a geometric projection process where said transfer function T_k is used;

an object image updating means for updating [[an]] image data of said single object image provided in said reduced image estimating means by projecting a difference between said estimated image of each reduced object images which comes from said reduced image estimating means and each of said reduced object images which is captured under said known condition of the micro lens array, using said inverse process T_k^{-1} of said geometric projection process; and

an iterative control means for firstly giving said initial image data to said reduced image estimating means as an initial value of [[an]] image data of said single object image, and then repetitively conducting [[an]] estimating processing of said reduced image estimating means as well as [[an]] updating processing of said object image updating means until said difference satisfies ~~satisfying~~ a predetermined condition, then outputting [[an]] image data of said single object image at the time of said difference satisfying said predetermined condition as a final image data of an object image.

Claim 2 (Currently Amended): An image configuring apparatus according to Claim 1, wherein said object image configuring means further comprises a shift amount calculating means for calculating a shift amount in regard to a gap of relative positions between said reduced object images through a correlation calculation between said reduced object images by using [[an]] image data of a plurality of said reduced object images.

Claim 3 (Original): An image configuring apparatus according to Claim 2, wherein said object image configuring means further comprises a projection process deriving means for obtaining a conversion equation indicating said geometric projection process employed in said reduced image estimating means based on said shift amount obtained in said shift amount calculating means.

Claim 4 (Currently Amended): An image configuring apparatus according to Claim 2, wherein said generating means of initial object image in said object image configuring means generates [[an]] image data of a single object image by arranging a plurality of said reduced object images onto a same area based on said shift amount obtained in said shift amount calculating means, and

then generates [[an]] initial image data of said single object image by interpolating blank pixels with respect to said image data.

Claim 5 (Currently Amended): An image configuring method for configuring a single object image based on [[an]] image data of a plurality of reduced object images obtained by photographing an object [[as]] using a compound-eye camera that focuses a plurality of reduced object images on a photo detector having a plurality of light receiving elements through a micro lens array having a plurality of micro lenses arrayed therein, comprising the steps of:

configuring the plurality of micro lenses and the plurality of light receiving elements in corresponding micro lens/light receiving element pairs positioned without alignment error,

setting a distance between the object and the micro lens array, according to an aligning distance of each micro lens of the microlens array and the focal length of the micro lens array,

generating [[an]] initial image data of a single object image based on [[an]] image data of a plurality of said reduced object images using known conditions and an inverse transfer function T_k^{-1};

estimating an estimated image of each of said reduced object images from [[an]] image data of a provided single object image based on a geometric projection process using a transfer function T_k;

updating [[an]] image data of said single object image provided in said reduced image estimating process by projecting a difference between estimated images of each of said reduced object images and each of said reduced object images in an inverse process (T_k^{-1}) of said geometric projection process;

providing said initial image data to said reduced image estimating process as an initial value of an image data of said single object image;

repetitively conducting said reduced image estimating process as well as said object image updating process until said difference satisfies ~~satisfying~~ a predetermined condition; and

outputting image data of said single object image at the time of said difference satisfying said predetermined condition as a final image data of an object image.